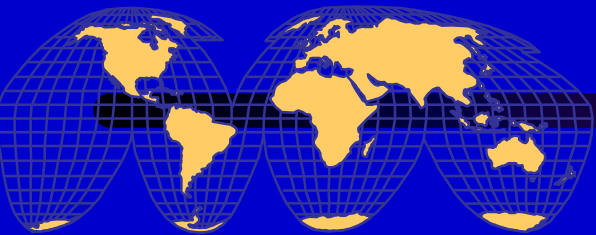


*Alternative Fuel Vehicle (AFV)
Programs in Asia and the Near East
Supported by the U.S. Agency for
International Development (USAID)*



Presented May 20th, 2003 at the 9th DOE National Clean Cities
Conference and Exposition

Panel: The Role of U.S. Agencies in Building AFV Markets
Abroad

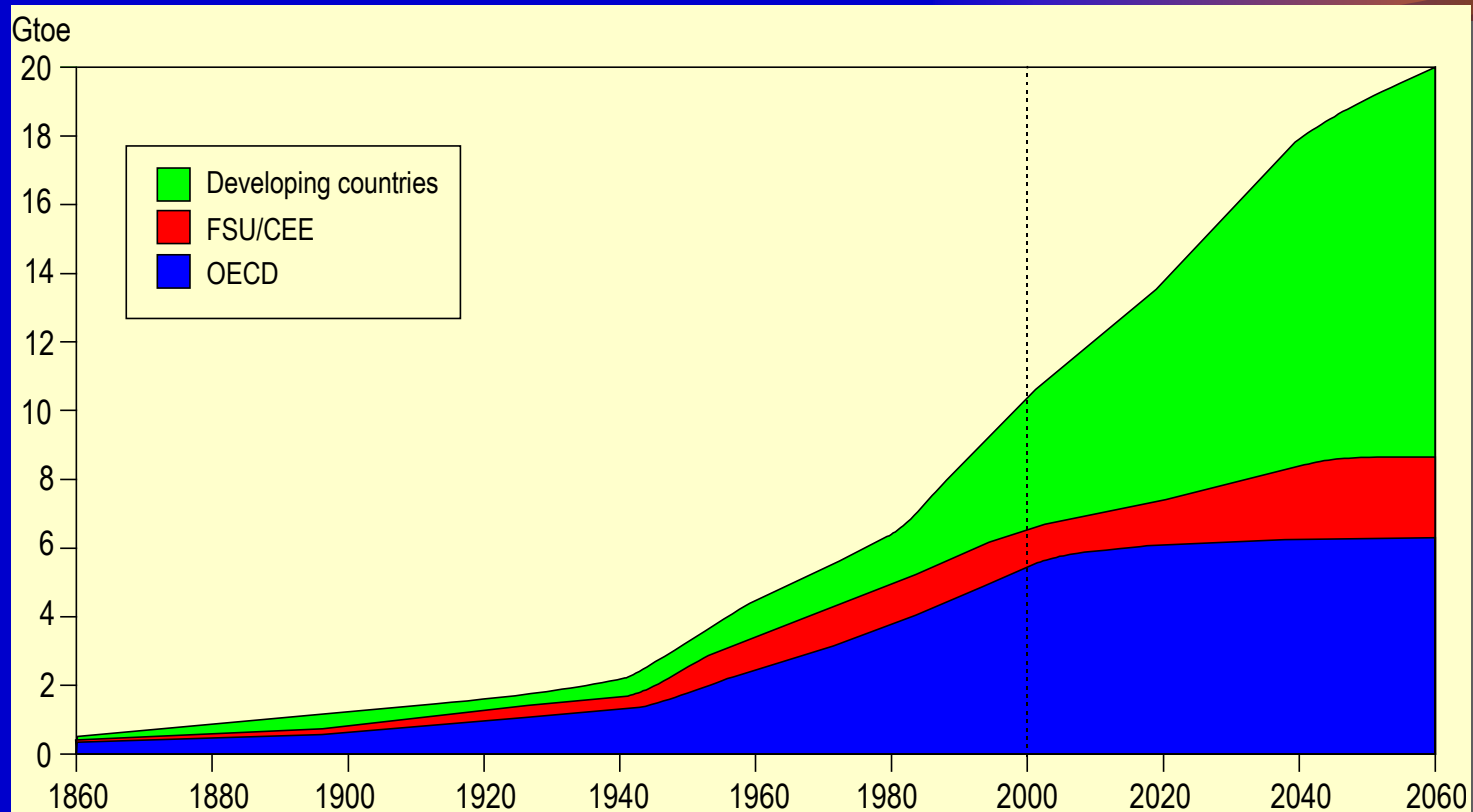
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USAID—A Brief Introduction

- USAID is a U.S. Government (USG) Agency that was created in 1949, during the Marshall Plan at the end of WWII, with an international development assistance mandate
- The longer-term international development mandate of USAID complements the foreign policy mandate of the Department of State (DOS)
- The USAID Administrator reports to the Secretary of State
- The USAID Mission Director represents USAID on the Country Team, Chaired by the Ambassador, in each of the nearly 100 countries that USAID has programs
- Domestic USG agencies that do not have offices abroad work closely with USAID and the Country Team to design and implement activities abroad
- Foreign Assistance Appropriations are approx. \$7 billion each year
- The USAID Bureau for Asia and the Near East (ANE) is responsible for approx. \$2 billion in appropriations each year

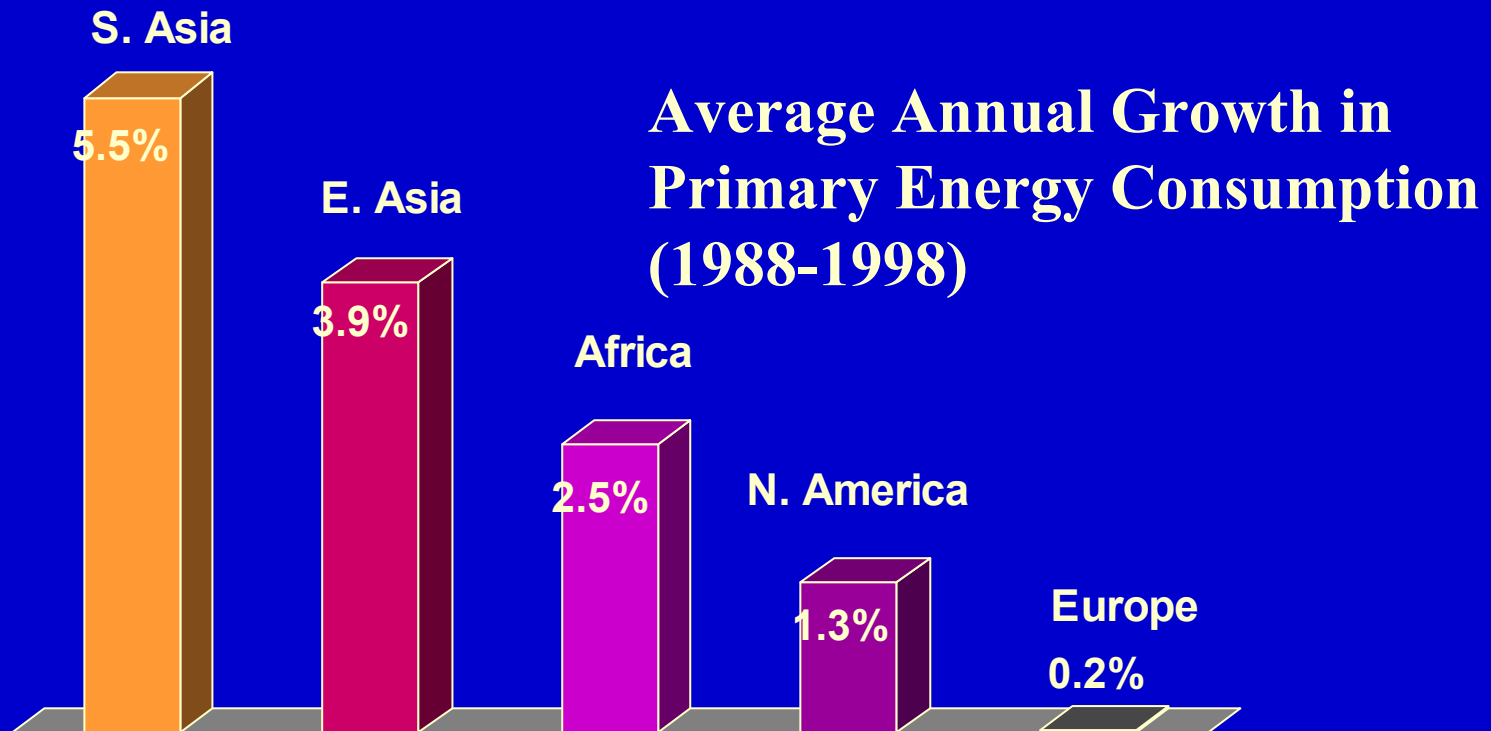
Energy Consumption Trends: The Developing Country Trajectory



Source: World Energy Council, World Bank.

The graph for the period 2000-2060 shows a scenario of future energy consumption based on current trends.

Highest Consumption Growth Centers: South and East Asia



Source: BP Amoco Statistical review of World Energy 1999

USAID Bureau for Asia and the Near East (ANE)

- Currently ANE Energy/Global Climate Change (GCC) **Mitigation Programs** are active in *eight “presence” countries*, and represent a **five-year investment of > \$300M:**

South Asia: *Bangladesh, India, Nepal, Sri Lanka*

East and Southeast Asia: *Indonesia, Mongolia, Philippines*

Near East: *Egypt*

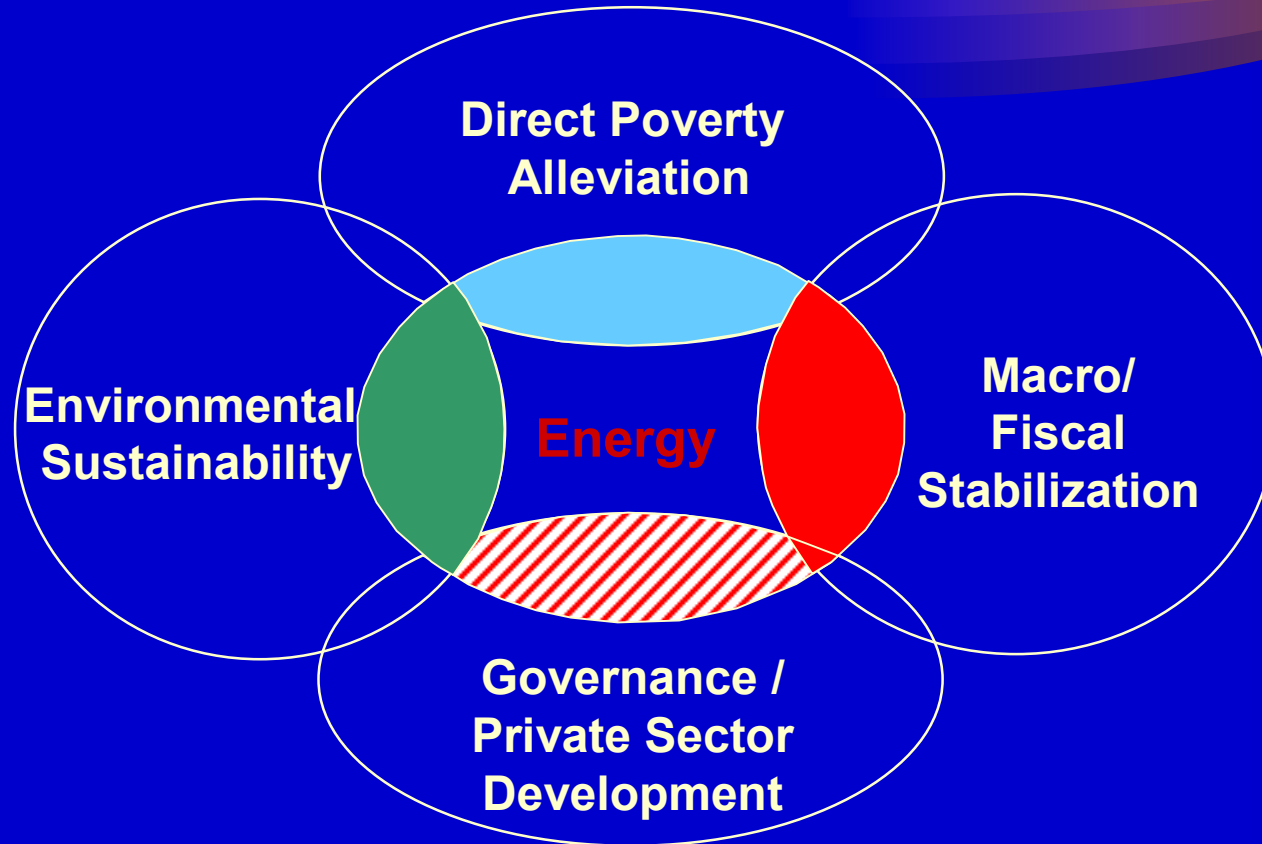
Regional: South Asia Regional Initiative/Energy (SARI/Energy) Program and the U.S.-Asia Environmental Partnership (US-AEP): Limited additional AFV activities in *Thailand*

Energy/GCC Program Objectives



- Reform of the energy sector to increase **competition** and expand the role of the **private sector**, while building **regulatory capacity** in the government
- Reform of the energy sector to **improve/expand** the **delivery of energy services** to customers, while meeting **energy security, economic growth** and **environmental** objectives
- Program activities in the **1990s** primarily targeted the **power and hydrocarbon sectors**; transport sector activities were the exception (Egypt; India)
- **Since 2000** most USAID Missions with energy programs have introduced activities that target the **transport sector**

Threads: Multiple Development Agendas in Support of Sustainable Energy Policy & Programs



The Clean Cities International Map: India, Bangladesh and the Philippines



- The Clean Cities Program initially expanded to Latin American countries
- More recently the Clean Cities International (CCI) Program has been focusing on Asia
- USAID Missions in India, Bangladesh and the Philippines have pursued collaboration with CCI
- The initial three Asian mega-cities targeted are Delhi, Dhaka and Manila (> 10 million people in each city)

Clean Cities International: India, Bangladesh and the Philippines



USAID Energy Programs Partner with Multiple U.S. Government Agencies



- Department of Energy
- Environmental Protection Agency
- Department of Commerce/Foreign Commercial Service
- Department of Interior
- Trade and Development Agency
- Export-Import Bank

USAID Energy Programs Partner with Multiple International Agencies



- Asian Development Bank
- World Bank
- Global Environment Facility
- United Nations Development Program
- World Resources Institute
- Canadian International Development Agency
- Others

USAID Supports “Reverse” Study Tours by Asians to the U.S.



- Attend Conferences, e.g. National Clean Cities, NGV2002
- Visit Federal, State and Local Government Offices: Exposure to Policy, Legal, Regulatory Framework, and Standards & Safety Code Options
- Site Visits: Technology Providers; Infrastructure Developers; Fleet Operators
- Visit Research and Development Institutions; Public Outreach Organizations
- Build the Foundations of a Clean Cities-type, broad-based Stakeholder Process to Develop and Sustain an AFV Program

Examples of USAID-Funded AFV Site Visits in the U.S.



- SunLine Transit Agency (SLTA)
- College of the Desert/Energy Technology Training Center
- National Alternative Fuels Training Consortium (NAFTC)
- IMPCO Technologies
- Tulsa Gas Technologies
- Center for Environmental Research & Technology-CA
- Los Angeles Metropolitan Transit Authority (LA MTA)
- New York City Metropolitan Transit Authority (NY MTA)
- (Atlanta) Metropolitan Area Rapid Transit Authority (MARTA)
- Washington Metropolitan Area Transit Authority (WMATA)

USAID Support of AFVs in India: USAID a Vital USG Team Member



- USAID/India Energy, Environment and Enterprise (E3) Office builds on 30 years of in-country experience working in Indian energy sector. Dedicated USAID team of @ 10 professionals manage energy portfolio of @ \$30 million in activities per year, with multiple economic growth, poverty reduction, energy security, and environmental objectives
- USG Team Approach Show-cased during Presidential visit to India in Mar. 2000 and at COP8 in Delhi, Oct. 2002
- USAID works closely with the public and private sectors in both India and the U.S. to design and implement AFV-related activities

Other USG agencies that USAID works closely with include:

- Department of Energy (DOE), esp. Clean Cities International, National Energy Technology Laboratory (NETL) and DOE/HQ Science and Technology (S&T) Forum
- Environmental Protection Agency (EPA), incl. Support to NAFTA and use of IES policy analysis tool and “International Vehicle Emissions Model” (CERT)
- Foreign Commercial Service (FCS) Officers of Dept. of Commerce (USAEP)

USAID Support of AFVs in India: Electric Vehicles

- In 1997 USAID launched **REVA Electric Vehicle Program**: Amerigon Inc. of CA & local Maini firm form REVA Electric Car Co. (RECC), pilot test 4-wheel sedan. \$1.8M USAID/ICICI TDC Reflow funding to accelerate commercial production in India. REVA debut in Delhi in April 2002, export orders in hand from Nepal and Britain.
- In 1998 USAID launched **Indian Zero Emission Transportation (IZET)** Program with Nexant/Bechtel to determine technical and economic feasibility of two and three-wheeler EVs, and to accelerate commercialization. MOU between Bajaj Auto in Pune and Unique Mobility of Golden CO. New Generation Motors and Bajaj apply IZET lessons learned, Bajaj manufacturing 1200 three-wheelers for sale in 2003. Pizza Hut (Delhi) and Sheraton Hotel (Agra) demonstrate pilot vehicles.
- Zero Emissions at Tailpipe, but Life Cycle Emissions using primarily coal-fired electricity in India still an issue, esp. for GHG emissions

USG Support of AFVs in India: Natural Gas Vehicles (NGVs)

- Annual cost of air pollution in Delhi (population of 14 million) is \$200M from increasing respiratory diseases; India has 23 cities with populations exceeding one million people each, 3 mega-cities (>10M)
- Supreme Court (SC) Order for buses in the National Capital Region in Delhi to convert to CNG not heeded until daily fines issued to diesel bus operators as of April 5, 2002. Tussle between federal government, SC, unions etc. a political “hot potato”, resolution has been slow and contentious.
- Lessons Learned from Command and Control approach in India juxtaposed with Market Mechanisms approach promoted by EPA
- Limited infrastructure planning initially, failure to balance no. of NGVs with no. of fueling stations (as in Egypt) until recently resulted in long queues and angry customers
- Delhi now has 60,000 NGVs, including 7,000 buses, and 100 CNG stations, and is the fastest growing CNG program in the world
- Adequacy of CNG supplies remains an issue. Indraprastha Gas Ltd. (IGL), the sole supplier, and plans to import pipeline gas and LNG have been delayed. Recent Reliance Corp. gas discovery on east coast is significant (>5 tcf), but will require several years lead time for development

Clean Cities International, New Delhi Program

- USAID/USAEP supports DOE/CCI “Reverse Trade Missions” and Study Tours to U.S. for exposure to lessons learned and networking opportunities with private and public sector in U.S., including most CCI-Delhi partners
- Study Tours often combine delegations from multiple countries, allowing for greater exchange of developing country “lessons learned” in designing and implementing AFV programs
- CCI-Delhi Partners include: ANGI International; Clean Fuel Technologies; Centre for Science and Environment (CSE) eMobility International.; IMPCO Technologies; Liquid Controls; DOE National Energy Technology Laboratory (NETL); OPW Equipment; Propane Education and Research Council (PERC); Society of Indian Automobile Manufacturers (SIAM); Science Applications International Corporation (SAIC); WVU & the NGV Institute
- USAID agreement with NETL has accessed more than \$5 million in assistance from NETL during the past five years, (primarily for clean coal technologies), with additional funding from USAID planned. Strong USAID-NETL collaboration has benefited the ramp-up of the Indian NGV program.

USAID Support of AFVs in India: Hydrogen/Fuel Cells

- The Indo-U.S. Science and Technology S&T) Forum, chaired by the S&T Adviser to the U.S. Secretary of State, and the Secretary of the Dept. of S&T in India, is facilitating interaction among government, academia, and industry
- Objectives of the Forum's first energy-related workshop were to introduce key Indian and U.S. fuel cell experts and develop a synopsis of plans for joint fuel cell projects
- Partners in this workshop included: Tata Energy Research Institute (TERI); Indian Space Research Organization; Bharat Heavy Electricals Ltd.; Fuel Cell Energy; USDOE, including multiple national laboratories (Argonne, Pacific Northwest, Los Alamos and NETL); Gas Authority of India (GAIL); REVA Electric Car Co.; Energy Conversion Devices (ECD); Siemens Westinghouse; US. Army Corp of Engineers, NED Energy; Diversified Commercial Hydrogen Technology; and others

USAID Support of AFVs in India: Hydrogen/2 or 3-Wheeler ICEs



- As a stepping stone to India's goal of establishing a National Hydrogen Industry, an alliance is being formed to commercialize hydrogen-fueled 2/3 wheeler Internal Combustion Engines (ICEs) with hydrogen from domestic sources (renewable energy sources-- e.g. wind energy or surplus bagasse cogeneration electricity for water electrolysis; gasification of bagasse; or "wasted" hydrogen in the chlor-alkali industry)
- Input partners include the Ministry of Non-Conventional Energy Sources (MNES): Energy Conversion Devices, USA; Punjab Alkalies and Chemicals (PACL), Chandigarh; Hydrogen Systems Asia (HAS) Pvt. Ltd., Delhi; and Mahindra & Mahindra Ltd., Mumbai
- Metal Hydride Storage Systems are planned

USAID Support of AFVs in Bangladesh

- In Jan. 2002 the new Prime Minister Issued a Mandate to convert 10,000 vehicles to CNG by Jan. 2004
- Conversion targets bus fleets and two and three-stroke engine vehicles
- In Feb. and May 2002 two Bangladeshi Delegations of High-Level Decision-Makers and Program Implementation Stakeholders completed extensive U.S. Study Tours
- Bangladeshi Delegation attended World NGV2002 Conference w/ additional Training Event and Site Visits, with opportunity to share lessons learned with other developing countries
- Multiple USG Agencies & Donors support NVG program in Bangladesh: USAID, DOE, CIDA, ADB, World Bank
- Results of Jan. 2003 DOE CCI Scoping Visit to Bangladesh: Clean Cities Dhaka Kick-off Workshop & NGV Safety & Maintenance Training Project with USAID in 2003
- May 2003: USAID/Bangladesh Proposes Development Credit Authority (DCA)/Loan Guarantee Program (LPG) for fueling stations to complement ADB Dhaka Clean Fuels infrastructure project

USAID Support of AFBVs in Nepal



- In 1993 USAID initiated Electric Vehicle (EV), three-wheeler, Mini-Bus Program with Global Resources Institute (GRI): 600 Safa tempos now operate in Kathmandu (KTM) Valley as public transportation
- USAID/Nepal Energy Program since 1998 prioritizes Private Sector Hydropower Development
- All Hydrocarbons are imported and Air Pollution in Kathmandu Valley is severe, with large human health costs
- Nepalese EV industry plagued with problems: Inconsistent government policies; inefficient industry structure; multiple battery issues
- In 2002 Kathmandu EV Alliance (KEVA) formed by govt./NGO/private partners to access international funding and expertise; resolve implementation issues; also target trolley buses; and initiate Integrated Transportation Plan

USAID Support of AFVs in the Philippines



- USAID/Philippines Energy/GCC Mitigation Program targeted power sector since 1996, added transport sector in 2001
- Philippines Dept. of Energy (PDOE) and USAID co-chair Multi-Stakeholder Steering Committee since 1996
- April 2002 CCI Scoping Mission to the Philippines recommended PDOE as Lead Clean Cities Organization
- Other Participants: national agencies for environment, science & technology, transportation; Metropolitan Manila Development Authority (MMDA); Gas and vehicle suppliers; NGOs e.g. Partnership for Clean Air
- Sept. 2002 USAID-funded Philippines Delegation to World NGV2002 conference & exposition, training and site visits
- USAID using EPA Integrated Environmental Analysis (IES) policy analysis tool to refine policies/measures/implementation details
- Possible AFV Fuel Choices: LNG imports; biodiesel (CSE); electricity from geothermal, wind or solar

Downstream Sector: NGVs

PNOC CNG-Refilling Station and 3-MW Plant



USAID Support of AFVs in Thailand

- USAID represented in Thailand through regional program, the U.S.-Asia Environmental Partnership (USAEP), and a new USAID regional office in Bangkok in 2003 (bilateral office was closed in 1996)
- Thailand launched a NGV program in 1984 to utilize indigenous natural gas, save foreign exchange, and reduce ambient air pollution in Bangkok
- 18 years later only 1% of NG used in transport sector: Demonstration Pilots w/ New Zealand NGV Bus Conversions (5 in 1984), German OEM NGV Buses (82 in 1993) and 20 Diesel Dual Fuel Trucks met with little success
- In March 2002 Government issued policy to encourage conversion of Taxis
- By Sept. 2002 conversion of 700 (1100 by 12/02) taxis to NGV-gasoline bi-fuel systems—yet mixed results with off-line, storage cylinder trailer approach to refueling stations
- Government efforts to accelerate NGV programs strengthened in 2002, with NGV loan and fuel pricing policies; Bangkok pipeline extensions; and additional refueling stations
- USAEP supported Participation of Thai Delegation at World NGV2002 Conference, w/ additional Training Event and Site Visits, to catalyze accelerated Thai NGV program

USAID Support of AFVs in Indonesia



- USAIDIndonesia and U.S. Embassy promoted removal of lead from gasoline since 2000 (using Philippines model)—government-run hydrocarbon industry and pricing policies contributed to late introduction of non-leaded gasoline in Indonesia
- Indigenous hydrocarbons squandered with poor pricing signals and lack of market-driven sector
- In 2002 both USAID and ADB initiated Clean Air Initiatives, and the City of Bandung is the first to form a Clean Air Alliance and seek funding and expertise internationally to introduce environmentally-friendly fuels and a better public transportation system
- Additional unrest in Indonesia since 9/11 has hampered ability of USG-funded programs to place U.S. staff and implement clean energy programs

USAID Support of AFVs in Egypt

- Egypt NGV Program targets taxis and buses, commercialization activities began in 1996, uses local NG
- By 2002 40,000 taxis/microbuses converted and 60 CNG fueling stations in operation, with Egypt #8 of 49 countries promoting CNG vehicle programs
- Egypt program uniquely overcomes “chicken and egg” dilemma, with Ministry of Petroleum concessions to firms that construct and operate both CNG fueling stations and vehicle conversion centers (BP, ENI, Shell partnerships)
- Taxi conversion program took off quickly, due to large price differential between NG and gasoline. Electronic card to capture differential in paying off conversion loans very effective and popular
- 50 USAID-funded, imported OEM bus chasses to facilitate local production eventually of NGV buses. Slower ramp-up of public fleet bus program, low NG-diesel price differential

USAID Promotes Public-Private Partnerships



- U.S. Energy Association (USEA) Energy Partnership Program (EPP)
- U.S. Chamber of Commerce (USCC) as a Convener of U.S. Private Sector Partners and Business Associations in Developing Countries—e.g. USAID regional programs in Southeast Asia for Accelerated Economic Recovery in Asia (AERA) and the South Asia Regional Energy Coalition (SAREC) in the SARI/Energy Program
- Global Development Alliance (GDA)--2nd year of proposals in review process . 1st yr. India Livable Communities Initiative under Clean Air Initiative prioritizes High Capacity Bus Systems (HCBSs) and Electric Trolley Bus (ETB) corridors in Delhi
- Development Credit Authority (DCA) Loan Guarantee Program (LGP)—e.g. Bangladesh proposal

USAID as Your Partner?



Whether you represent the U.S. public or private sector, or the private sector in the U.S. or a developing country, the USAID office in the country of your destination may well be a worthwhile stop as you pursue your dreams for a greater role globally for AFVs in the future. Visit the USAID website at www.usaid.gov to find out more about USAID programs.